Biology in Focus

Better Lives Through Better Science

Mussels That Matter

Poised on the brink of mass extinction, freshwater mussels are the largest group of endangered animals in North America. About 70 percent of the 300 native species are considered endangered, threatened or of special concern. Biologists see the mussels' plight as a serious warning for our global ecology as a whole—when mussels begin to disappear, it is a sign that other species, and entire ecosystems, may be in peril as well.

Although Americans lament the destruction of biodiversity in the rain forests, they may not realize that astonishing biodiversity exists—and is at risk—in their own country. Many mussels found in the United States live nowhere else in the world. Their lighthearted names—such as orange-foot pimpleback, Tennessee heelsplitter and fuzzy pigtoe—hardly convey the severity of their predicament.

To protect freshwater mussels and, in turn, anticipate problems for other animals, the USGS Florida Caribbean Science Center is working to understand the complex factors leading to the mussels' decline. The USGS center, in Gainesville, Florida, is conducting an inventory and monitoring program of mussel populations across the Southeast. Information from this program is shared with government agencies and private companies to help prevent the destruction of mussel habitats. Eventually, biologists hope to reintroduce mussels to former habitats that have been restored.

The USGS Florida Caribbean Science Center enhances our quality of life by furthering the sound management of biological resources.

Photo by USGS Florida Caribbean Science Center

There was a time when freshwater mussels nearly paved the streambeds along large stretches of our waterways. Historical records tell of early settlers wading across the Ohio River and complaining that all the bottom-dwelling mussels made walking painful. In Alabama, the town of Muscle Shoals got its name from the piles of mussel shells found along the Tennessee River. In some riverbeds, there were likely more mussels by weight than all other plants and animals combined. Today, though, dams, polluted water, poaching, erosion and the deadly zebra mussel from Europe and Asia have made large freshwater mussel colonies a rare find.

Mussels Enhance Our Quality of Life

Freshwater mussels serve as sensitive indicators of environmental pollution. As mussels feed and breathe, they filter large quantities of water and deposit toxic

USGS science for a changing world

U.S. Department of the Interior
U.S. Geological Survey

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metals into their shells. By analyzing mussel shells, biologists can tell what's in the water and in what proportions. Moreover, by separating a shell's annual layers, biologists can select any year in the life of a mussel and learn about past water quality—say, 50 years ago—compared with today's. Researchers have even used mussels to trace contaminants to their source.

Bet You Didn't Know:

Freshwater mussels
- **Live up to 100 years**
- **Have no head and one foot**
- **Grow as long as 9 inches**

"By working together, we can help ensure adequate protection for freshwater mussels and their contributions to the environment, the economy and our quality of life."

Jim Williams
USGS biologist

Mussels not only oblige us as environmental barometers, but they also strengthen the health and stability of a stream. As mussels feed and breathe, they filter water and make it cleaner. And because mussels are at the very foundation of the aquatic food web, they contribute to the survival and vitality of other animals. A stream with abundant mussels can usually support more muskrats, otters, wading birds and game fish.

Mussels are good for the economy, too. Used in the past to make buttons, their main commercial use today is providing the pearl industry with inserts for oysters. Mussel shells are ground, shaped into beads and inserted into live oysters. The oysters respond by exuding layers of mineral to insulate themselves from this unwanted invader, inadvertently creating a lustrous, coveted gem. Most of the world's cultured pearls have centers made from mussels harvested in the United States. According to Robert Leisure, President of Shell Exporters of America, U.S. companies exported about $20 million worth of shells in 1997.

Photos by ©Richard T. Bryant

The shell of a purple bankclimber.

USGS Takes Action

"Our lives are inextricably linked to freshwater mussels," says Jim Williams, a biologist at the USGS Florida Caribbean Science Center. By using information obtained through the center's inventory and monitoring program, Williams and his colleagues are creating a biodiversity map of mussels across Alabama, Florida, Georgia, Mississippi and the Carolinas. The map is continually updated based on data provided by interested citizens, shell club members, museums and government agencies.

USGS provides data on the locations of rare and imperiled mussels to land managers such as the U.S. Forest Service,

By working through its science centers, the USGS Biological Resources Division promotes sound management of our nation's biological resources.

U.S. Fish and Wildlife Service, Army Corps of Engineers, Environmental Protection Agency and state heritage programs to help them make decisions about how to manage natural resources. This information also helps law enforcement agencies determine whether poachers have illegally transported mussels across state lines.

In addition, USGS biologists are raising mussels in captivity to study how various pesticides and metals influence growth and survival. By learning how mussels react to contamination in the laboratory, biologists can predict what to expect in a natural community.

Williams and his colleagues intend to take their laboratory work one step further by assisting the U.S. Fish and Wildlife Service with its efforts to reintroduce mussels to former habitats that have been restored. In doing so, these biologists will replenish streams and rivers not only with the mussels themselves but also with the benefits they bring.

Photos by USGS Florida Caribbean Science Center

Mussels are collected by divers using SCUBA gear.

USGS biologists sort mussels.

Informed Conservation Decisions

The number of imperiled mussels in the United States forecasts an extinction crisis that, unless prevented, may result in the complete loss of dozens of species and the further impoverishment of aquatic ecosystems. "Though USGS biologists at the Florida Caribbean Science Center have made great strides in helping mussels thrive, many species still need emergency attention," says Williams.

To help preserve mussel populations, USGS biologists hope to continue making important breakthroughs in mussel research. And they continue to share their findings with natural resource agencies and land managers so that informed conservation decisions can be made. As Williams reflects, "By working together, we can help ensure adequate protection for freshwater mussels and their contributions to the environment, the economy and our quality of life."

To learn more about freshwater mussels and our nation's biological resources, visit the following Internet locations:

<http://www.nfrcg.gov/>
<http://biology.usgs.gov/>
<http://biology.usgs.gov/outreach/infocus.htm>

Or contact:

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Mussel photo by ©Richard T. Bryant

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